14:00 - 16:05 — Ronda

Session 1A15

SP7. Current Advances in Electromagnetics of Metal and HRI dielectric nanostructures

Organized by: Jose A. Sanchez-Gil, Francisco Gonzalez and Fernando Moreno

Chaired by: Jose A. Sanchez-Gil, Francisco Gonzalez and Fernando Moreno

14:00 : Keynote talk

Selected problems of light scattering by dielectric nanostructures

Boris Luk'yanchuk, Ramon Paniagua-Dominguez, A. Kuznetsov
*A*STAR (Singapore)*

Light scattering from structures with high refractive index may produce strong, opticallyinducedelectric and magnetic resonances. This allows controlling many characteristics of the scatteredlight, including its scattering diagram, intensity distribution and light polarization. As a consequence,it is possible to realize interference effects such as Kerker and Fano resonances, formation of opticalvortices and excitation of anapole modes. In this presentation we illustrate some of these effects withthe help of exact solutions in the Mie theory.

14:30 : Invited talk

Dielectric nanoantennas as a new way to enhance and direct scattered light with minimal losses

Pablo Albella, Toshihiko Shibanuma, Stefan A. Maier
Imperial College London (United Kingdom)

Plasmonic nanostructures enable control of light at subwavelength scale. However, losses are inevitable, especially at optical wavelengths. High-refractive index dielectrics show strong promise as a complementary nanophotonics platform. Dielectric nanostructures are able to show not only electric but also magnetic resonances, both with low-losses. Here, we present asymmetric-dimers of dielectric nanoparticles that exploit the interaction of those resonances to show tunable directional scattering. We also explore its application as tuneable routing element at nanoscale, suggesting applications like optical nanocircuitry.

14:50 : Invited talk

Localized magnetic plasmons in all-dielectric structures

Ramon Paniagua-Dominguez[1], Luis S. Froufe-Perez[2], J. J. Saenz[3], J. A. Sanchez-Gil[4]
[1]*A*STAR (Singapore),* [2]*University of Fribourg (Switzerland),* [3]*Donostia International Physics Center (Spain),* [4]*Instituto de Estructura de la Materia - CSIC (Spain)*

We show how an assembly of all-dielectric nonmagnetic scatterers can support a strong localized magnetic plasmon resonance considering collections of monodisperse high refractive index spheres exhibiting a strong magnetic dipole resonance. The effective magnetic permeability of such an ensemble is negative in a given fequency range, while the effective dielectric permittivity is possitive and small. Localized magnetic plasmon resonances can be excited in a metasphere made of such metamaterial.

15:10 : Invited talk

Polarization singularities on high index nanoparticles

Aitzol Garcia-Etxarri
Donostia International Physics Center (Spain)

We study the emergence of polarization singularities in the scattered fields of optical resonators excited by linearly polarized plane waves. First, we prove analytically that combinations of isotropic electric and magnetic dipoles can sustain L surfaces, and C lines. Moreover, we derive the anomalous scattering Kerker conditions trough singular optics arguments. Secondly, we demonstrate that high refractive index spherical resonators present such topologically protected featuresand unveil a Mobius strip structure in the main axis of the polarization ellipse.

15:30 : Invited talk

Magneto-optical activity in high-index dielectric materials

Nuno de Sousa[1], Juan Jose Saenz[1], Antonio Garcia-Martin[2]